

Basic Calculations

In the RUN Mode you can perform arithmetic calculations (addition, subtraction, multiplication, division) as well as calculations involving scientific functions.

1. **Addition and Subtraction**
2. **Multiplication**
3. **Division**
4. **Quotient and Remainder Division**
5. **Mixed Calculations**
6. **Other Useful Calculation Features**
7. **Using Variables**
8. **Fraction Calculations**
9. **Selecting Value Display Modes**
10. **Scientific Function Calculations**

1. Addition and Subtraction

Example $6.72 + 9.08$

[6] [.] [7] [2] [+] [9] [.] [0] [8] [EXE]

6.72+9.08
15.8

You can input the operation just as it is written. This capability is called “true algebraic logic.”

Be sure to press [AC] to clear the display before starting a new calculation.

2. Multiplication

Example 3.71×4.27

[AC] [3] [.] [7] [1] [X]
[4] [.] [2] [7] [EXE]

3.71×4.27
15.8417

- The range of this calculator is $-9.9999999 \times 10^{99}$ to $+9.9999999 \times 10^{99}$.

3. Division

Example $64 \div 4$

[AC] [6] [4] [÷] [4] [EXE]

64÷4
16



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Parentheses also come in handy when performing division. For full details on using parentheses, see “Parentheses Calculation Priority Sequence”.

●To use parentheses in a calculation

Example 1 $\frac{2 \times 3 + 4}{5}$

You should input this calculation as: $(2 \times 3 + 4) \div 5$

AC (2) × 3 + 4) ÷ 5 EXE

(2×3+4)÷5
2

Example 2 $\frac{6}{4 \times 5}$

You can input this calculation as: $6 \div (4 \times 5)$ or $6 \div 4 \div 5$.

AC 6 ÷ (4) × 5) EXE

6÷(4×5)
0.3

AC 6 ÷ 4 ÷ 5 EXE

6÷4÷5
0.3

4. Quotient and Remainder Division

This calculator can produce either the quotient or the quotient and remainder of division operations involving two integers. Use **[OPTN]** to display the Option Menu for the function key menu you need to perform quotient and remainder division.

Operation

Use the RUN Mode for quotient and remainder division.

Quotient Division <integer> **[OPTN]** **[F2]** (CALC) **[F2]** (Int÷) <integer> **[EXE]**

Remainder Division <integer> **[OPTN]** **[F2]** (CALC) **[F3]** (Rmdr) <integer> **[EXE]**

●To perform quotient division

Example To display the quotient produced by $61 \div 7$

AC 6 1 **[OPTN]** **[F2]** (CALC)

61

[F2]
Simp Int÷ Rmdr

$\boxed{F2}(\text{Int}\div) \boxed{7} \boxed{EXE}$

61 Int÷ 7 8

Simp Int÷ Rmdr

$\boxed{F2}$

- Remember that you can use only integers in quotient division operations. You cannot use expressions such as $\sqrt{2}$ or $\sin 60$ because their results have a decimal part.

•To perform remainder division

Example To display the remainder produced by $857 \div 48$

$\boxed{8} \boxed{5} \boxed{7} \boxed{F3}(\text{Rmdr}) \boxed{4} \boxed{8} \boxed{EXE}$

857 Rmdr 48 41

Simp Int÷ Rmdr

$\boxed{F3}$

Press \boxed{QUIT} to clear the Option Menu after you finish your remainder and quotient calculations.

- Remember that you can use only integers in remainder division operations. You cannot use expressions such as $\sqrt{2}$ or $\sin 60$ because their results have a decimal part.
- Quotient and remainder division can also be used with lists to divide a multiple integers by each other in a single operation.



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5. Mixed Calculations

(1) Mixed Arithmetic Calculation Priority Sequence

For mixed arithmetic calculations, the calculator automatically performs multiplication and division before addition and subtraction.

Example 1 $3 + 5 \times 6$

$\boxed{AC} \boxed{3} \boxed{+} \boxed{5} \boxed{\times} \boxed{6} \boxed{EXE}$

3+5×6 33

Example 2 $7 \times 8 - 4 \times 5$

$\boxed{AC} \boxed{7} \boxed{\times} \boxed{8} \boxed{-} \boxed{4} \boxed{\times} \boxed{5} \boxed{EXE}$

7×8-4×5 36

(2) Parentheses Calculation Priority Sequence

Expressions enclosed inside parentheses are always given priority in a calculation.

Example 1 $100 - (2 + 3) \times 4$

AC 1 0 0 - (2 + 3)
X 4 EXE

100-(2+3)×4
80

Example 2 $(7 - 2) \times (8 + 5)$

AC (7 - 2) (8 + 5)
EXE

(7-2)(8+5)
65

- A multiplication sign immediately in front of an open parenthesis can be omitted.

- Any closing parentheses at the end of a calculation can be omitted, no matter how many there are.

Parentheses are always closed in the operation examples presented in this manual.

(3) Negative Values

Use the $(-)$ key to input negative values.

Example $56 \times (-12) \div (-2.5)$

AC 5 6 X (- 1 2 ÷
(- 2 . 5) EXE

56×-12÷-2.5
268.8

(4) Exponential Expressions

Use the EXP key to input exponents.

Example $(4.5 \times 10^{75}) \times (-2.3 \times 10^{-79})$

AC 4 . 5 EXP 7 5 X (- 2 . 3
EXP (- 7 9) EXE

4.5E75×-2.3E-
79
-1.035E-03



The above shows what would appear when the exponential display range is set to Norm 1. It stands for -1.035×10^{-3} , which is -0.001035 .

(5) Rounding

Example $74 \div 3$

AC 7 4 \div 3 EXE

74 \div 3
24.66666667

The actual result of the above calculation is 24.66666666... (and so on to infinity), which the calculator rounds off. The calculator's internal capacity is 15 digits for the values it uses for calculations, which avoids accuracy problems with consecutive operations that use the result of the previous operation.

6. Other Useful Calculation Features

(1) Answer Memory (Ans)

Calculation results are automatically stored in the Answer Memory, which means you can recall the results of the last calculation you performed at any time.

•To recall Answer Memory contents

Press **SHIFT** and then **Ans** (which is the shifted function of the **(=)** key).

This operation is represented as **SHIFT** **Ans** throughout this manual.

Example To perform $3.56 + 8.41$ and then divide 65.38 by the result

AC 3 . 5 6 + 8 . 4 1 EXE
6 5 . 3 8 \div SHIFT Ans EXE

3.56+8.41
11.97
65.38 \div Ans
5.461988304

(2) Consecutive Calculations

If the result of the last calculation is the first term of the next calculation, you can use the result as it is on the display without recalling Answer Memory contents.

•To perform a consecutive calculation

Example To perform 0.57×0.27 , and then add 4.9672 to the results

AC 0 . 5 7 \times 0 . 2 7 EXE
+ 4 . 9 6 7 2 EXE

0.57 \times 0.27
0.1539
Ans+4.9672
5.1211

(3) Replay

While the result of a calculation is on the display, you can use \leftarrow and \rightarrow to move the cursor to any position within the expression used to produce the result. This means you can back up and correct mistakes without having to input the entire calculation. You can also recall past calculations you have already cleared by pressing $\boxed{\text{AC}}$.

Operation

The first press of \rightarrow displays the cursor at the beginning of the expression, while \leftarrow displays the cursor at the end. Once the cursor is displayed, use \rightarrow to move it right and \leftarrow to move it left.

•To use Replay to change an expression

Example To calculate 4.12×6.4 and then change the calculation to 4.12×7.1

$\boxed{\text{AC}} \boxed{4} \boxed{\cdot} \boxed{1} \boxed{2} \boxed{\times} \boxed{6} \boxed{\cdot} \boxed{4} \boxed{\text{EXE}}$

4.12×6.4
26.368

\leftarrow

4.12×6.4_

$\leftarrow \leftarrow \leftarrow \boxed{7} \boxed{\cdot} \boxed{1} \boxed{\text{EXE}}$

4.12×7.1
29.252

Multi-Replay

Pressing $\boxed{\text{AC}}$ and then \uparrow or \downarrow sequentially recalls and displays past calculations.

(4) Error Recovery

Whenever an error message appears on the display, press \leftarrow or \rightarrow to re-display the expression with the cursor located just past the part of the expression that caused the error. You can then move the cursor and make necessary corrections before executing the calculation again.

•To correct an expression that causes an error

Example To recover from the error generated by performing $148 \div 0 \cdot 3.37$ instead of $148 \div 0.3 \times 3.37$

$\boxed{\text{AC}} \boxed{1} \boxed{4} \boxed{8} \boxed{\div} \boxed{0} \boxed{\cdot}$
 $\boxed{\times} \boxed{3} \boxed{\cdot} \boxed{3} \boxed{7} \boxed{\text{EXE}}$

148÷0.×3.37

Ma ERROR

◀ (You could also press ▶.)

148÷0.337

SHIFT INS 3

(See below for details on making corrections.)

148÷0.333.37

EXE

148÷0.333.37
1662.533333

(5) Making Corrections

Use the ◀ and ▶ keys to move the cursor to the position you want to change, and then perform one of the operations described below. After you edit the calculation, you can execute it by pressing EXE, or use ▶ to move to the end of the calculation and input more.

●To change a step

Example To change cos60 to sin60

cos 6 0

cos 60 _

◀ ◀ ◀

cos 60

sin

sin 60

●To delete a step

Example To change 369××2 to 369×2

3 6 9 × × 2

369××2 _

◀ ◀ DEL

369×2

●To insert a step

Example To change 2.36² to sin2.36²

2 . 3 6 x²

2.36² _



2.36²

SHIFT INS

2.36²

sin

sin 2.36²

- When you press **SHIFT** **INS** a space is indicated by the symbol "□". The next function or value you input is inserted at the location of "□". To abort the insert operation without inputting anything, move the cursor, press **SHIFT** **INS** again, or press **←**, **→** or **EXE**.

7. Using Variables

A total of 26 variables, named A through Z, are available for assignment of numeric values. Variable contents are retained even when you turn the calculator off. Note that when you assign a value to a variable, the calculator assigns its 15-digit internal value.

●To assign a value to a variable

Operation

<value or expression> **→** **ALPHA** <variable name: A to Z>

Example 1 To assign 1024 to variable A

AC **1** **0** **2** **4** **→** **ALPHA** **A** **EXE**

1024→A 1024

Example 2 To display the contents of variable A

AC **ALPHA** **A** **EXE**

A 1024

Example 3 To clear the contents of variable A

To clear a variable, simply assign 0 to it.

AC **0** **→** **ALPHA** **A** **EXE**

0→A 0

●To assign the same value to more than one variable

Operation

<value or expression> \rightarrow [ALPHA] <start variable name> [ALPHA] [F3] (~) [ALPHA] <end variable name> [EXE]

Example To assign the result of $\sqrt{2}$ to variables A, B, C, D, and E

[AC] [SHIFT] [✓] [2] \rightarrow [ALPHA] [A] [ALPHA] [F3] (~)
[ALPHA] [E] [EXE]

```
√2→A~E
1.414213562
```

●To clear the contents of all variables

In the Main Menu, select the **MEM** icon and press [EXE].

```
Memory
Memory Usage
Reset

Select:[↑][↓]
Set :[EXE]
```

Select Memory Usage.

[EXE]

```
Memory Usage
Program: 0
Stat : 0
List : 0
6821 Free
DEL
```

Press \blacktriangledown to scroll the display until "Alpha" is highlighted.

\blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown

```
Memory Usage
U-Win : 0
Table : 0
Hlpha : 50
6821 Free
DEL
```

[F1]

[F1] (DEL)

```
YES NO
```

[F1]

[F4]

Press [F1] (YES) to clear all variables or [F4] (NO) to abort the clear operation without clearing anything.

8. Fraction Calculations

(1) Fraction Display and Input

Example 1 Display of $\frac{3}{4}$

3.4

Example 2 Display of $3\frac{1}{4}$

3.1.4

Mixed fractions (such as $3\frac{1}{4}$) are input and displayed as:

integer┐numerator┐denominator.

Improper fractions ($15/7$) and proper fractions (such as $1/4$) are input and displayed as: numerator┐denominator.

Use the $\frac{a}{b}$ key to input each part of a fraction.

●To input a fraction

Operation

Proper Fraction or Improper Fraction Input: <numerator value> $\frac{a}{b}$ <denominator value>

Mixed Fraction Input: <integer value> $\frac{a}{b}$ <numerator value> $\frac{a}{b}$ <denominator value>

Example To input $3\frac{1}{4}$

Press [3] $\frac{a}{b}$ [1] $\frac{a}{b}$ [4].

Note that the maximum size of a fractional value is 10 digits, counting the integer, numerator, and denominator digits and separator symbols. Any value longer than 10 digits is automatically converted to its equivalent decimal value.

(2) Performing Fraction Calculations

Example $\frac{2}{5} + 3\frac{1}{4}$

[AC] [2] $\frac{a}{b}$ [5] [+] [3] $\frac{a}{b}$ [1] $\frac{a}{b}$ [4] [EXE]

2.5+3.1.4
3.13.20

●To convert between fraction and decimal values

Operation

Fraction to Decimal Conversion: $\frac{F}{D}$

Decimal to Fraction Conversion: $\frac{F}{D}$

Example To convert the result of the previous example to a decimal and then back to a fraction

$\boxed{F \rightarrow D}$

$\boxed{2.5+3.14}$
3.65

$\boxed{F \rightarrow D}$

$\boxed{2.5+3.14}$
3.13.20

•To convert between proper and improper fractions

Operation

Mixed Fraction to Improper Fraction Conversion: $\boxed{\text{SHIFT}} \boxed{d/c}$

Improper Fraction to Mixed Fraction Conversion: $\boxed{\text{SHIFT}} \boxed{d/c}$

Example To convert the result of the previous example to an improper fraction and then back to a proper fraction

$\boxed{\text{SHIFT}} \boxed{d/c}$

$\boxed{2.5+3.14}$
73.20

$\boxed{\text{SHIFT}} \boxed{d/c}$

$\boxed{2.5+3.14}$
3.13.20

- The calculator automatically reduces the results of fraction calculations. You can use the procedure described under "Changing the Fraction Simplification Mode" below to specify manual fraction simplification.

•To perform a mixed decimal and fraction calculation

Example $5.2 \times \frac{1}{5}$

$\boxed{\text{AC}} \boxed{5} \boxed{\cdot} \boxed{2} \boxed{\times} \boxed{1} \boxed{\frac{1}{\square}} \boxed{5} \boxed{\text{EXE}}$

$\boxed{5.2 \times 1.5}$
1.04

- The result of a calculation that mixes fractions and decimal values is always a decimal value.

•To use parentheses in a fraction calculation

Example $\frac{1}{\frac{1}{3} + \frac{1}{4}} + \frac{2}{7}$

$\boxed{\text{AC}} \boxed{1} \boxed{\frac{1}{\square}} \boxed{)} \boxed{1} \boxed{\frac{1}{\square}} \boxed{3} \boxed{+} \boxed{1} \boxed{\frac{1}{\square}} \boxed{4} \boxed{)} \boxed{+} \boxed{2} \boxed{\frac{1}{\square}} \boxed{7} \boxed{\text{EXE}}$

$\boxed{1 \div (1.3 + 1.4) + 2}$
7.2

(3) Changing the Fraction Simplification Mode

The initial default of the calculator is automatic simplification of fractions produced by fraction calculations. You can use the following operation to change the fraction simplification mode to manual.

●To change the fraction simplification mode

Example To change the fraction simplification mode to manual

SHIFT **SETUP**

(Displays the Set Up Screen.)

```
F-Type : Y=
D-Type : Conct
Angle : Rad
Display: Nrm1
Simplify: Auto
Y= Parm
```

▼ **▼** **▼** **▼** **F2** (Man)

```
F-Type : Y=
D-Type : Conct
Angle : Rad
Display: Nrm1
Simplify: Man
Auto Man
```

F2

QUIT

When the fraction simplification is set to manual, you have to use the Option Menu to simplify fractions. You can let the calculator select the divisor to use for simplification or you can specify a divisor.

●To simplify using the calculator's divisor

Operation

Perform calculations after selecting the **RUN** icon in the Main Menu to enter the RUN Mode.

To display the simplification menu: **OPTN** **F2** (CALC)

To select automatic simplification: **F1** (Simp) **EXE**

To specify the divisor for simplification*: **F1** (Simp) <Divisor> **EXE**

* You can specify only a positive integer as the divisor.

Example To perform the calculation $1\frac{6}{27} + 1\frac{1}{9}$ and reduce the result

AC **1** **a/b** **6** **a/b** **27** **+** **1** **a/b**
1 **a/b** **9** **EXE**

```
1.6.27+1.1.9
2.9.27
```

(The result that appears when using manual simplification is the least common multiple of the fractions used in the calculation.)

OPTN **F2** (CALC) **F1** (Simp) **EXE**

```

1.6.27+1.1.9
2.9.27
Simp
F=3
2.3.9
Simp Int: Rmdr
  
```

F1

- F = 3 indicates that 3 is the divisor.
- The calculator automatically selects the smallest possible divisor for simplification.

Repeat the above operation to simplify again.

F1 (Simp) **EXE**

```

F=3
2.3.9
Simp
F=3
2.1.3
Simp Int: Rmdr
  
```

F1

Try once again.

F1 (Simp) **EXE**

```

Simp
F=3
2.1.3
Simp
2.1.3
Simp Int: Rmdr
  
```

F1

This display indicates that further simplification is impossible.

●To simplify using your own divisor

Example To perform the above calculation and then specify 9 as the divisor to use for simplification

F1 (Simp) **9** **EXE**

```

1.6.27+1.1.9
2.9.27
Simp 9
F=9
2.1.3
Simp Int: Rmdr
  
```

F1

- If the value you specify is invalid as a divisor for simplification, the calculator automatically uses the lowest possible divisor.

9. Selecting Value Display Modes

You can make specifications for three value display modes.

Fix Mode

This mode lets you specify the number of decimal places to be displayed.

Sci Mode

This mode lets you specify the number of significant digits to be displayed.



Norm 1/Norm 2 Mode

This mode determines at what point the display changes over to exponential display format.

Display the Set Up Screen and use the  and  keys to highlight "Display".



• To specify the number of decimal places (Fix)

1. While the set-up screen is on the display, press  (Fix).
2. Press the function key that corresponds to the number of decimal places you want to set (0 to 9).
 - Press  to display the next menu of numbers.

Example To specify two decimal places



 (Fix)



 (2)



Press the function key that corresponds to the number of decimal places you want to specify.

- Displayed values are rounded off to the number of decimal places you specify.
- A number of decimal place specification remains in effect until you change the Norm Mode setting.

• To specify the number of significant digits (Sci)

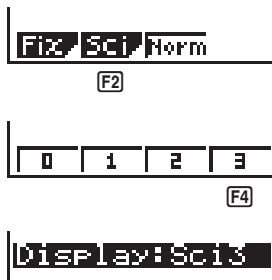
1. While the set-up screen is on the display, press **F2** (Sci).
2. Press the function key that corresponds to the number of significant digits you want to set (0 to 9).
 - Press **▷** to display the next menu of numbers.

Example To specify three significant digits

F2 (Sci)

F4 (3)

Press the function key that corresponds to the number of significant digits you want to specify.



- Displayed values are rounded off to the number of significant digits you specify.
- Specifying 0 makes the number of significant digits 10.
- A number of significant digit specification remains in effect until you change the Norm Mode setting.

• To specify the exponential display range (Norm 1/Norm 2)

Press **F3** (Norm) to switch between Norm 1 and Norm 2.

Norm 1: $10^{-2} (0.01) > |x|, |x| \geq 10^{10}$

Norm 2: $10^{-9} (0.000000001) > |x|, |x| \geq 10^{10}$

10. Scientific Function Calculations

Use the **RUN Mode** to perform calculations that involve trigonometric functions and other types of scientific functions.

(1) Trigonometric Functions

Before performing a calculations that involves trigonometric functions, you should first specify the default angle unit as degrees (°), radians (r), or grads (g).

■ Setting the Default Angle Unit

The default angle unit for input values can be set using the set up screen. If you set degrees (°) for example, inputting a value of 90 is automatically assumed to be 90°. The following shows the relationship between degrees, radians, and grads.

$$90^\circ = \pi/2 \text{ radians} = 100 \text{ grads}$$

●To set the default angle unit

Example To change the angle unit from radians to degrees

SHIFT SET UP

```
F-Type :Y=
D-Type :Conct
Angle :Rad
Display:Nrml
Simplify:Auto
|Y=|Rm
```

▼▼ F1 (Deg)

```
F-Type :Y=
D-Type :Conct
Angle :Deg
Display:Nrml
Simplify:Auto
|Deg|Rad|Gra
```

F1

QUIT

```
-
```

- Once you change the angle unit setting, it remains in effect until you change it again using the set up screen. You also should check the set up screen to find out what the current angle unit setting is.

■ Converting Between Angle Units

You can use the following procedure to input a value using an angle unit that is not the current default angle unit. Then when you press **EXE**, the value will be converted to the default angle unit.

●To convert between angle units

Example To convert 4.25 radians to degrees while degrees are set as the default angle unit

AC 4 . 2 5 OPTN >

```
4.25
```

```
NUM ANGL
```

F2



F2 (ANGL) **F2** (r) **EXE**

4.25°
243.5070629

0 r g

F2

■ Trigonometric Function Calculations

Always make sure that the default angle unit is set to the required default before performing trigonometric function calculations.

● To perform trigonometric function calculations

Example 1 $\sin(63^\circ 52' 41'')$

Default angle unit: Degrees

SHIFT **SETUP** **▼** **▼** **F1** (Deg) **QUIT**

sin **6** **3** **OPTN** **▶** **F2** (ANGL) **▶** **F1** (° ' ") **5** **2** **F1** (° ' ") **4** **1** **F1** (° ' ") **EXE**

Result: 0.897859012

Example 2 $\sec\left(\frac{\pi}{3}\text{ rad}\right) = \frac{1}{\cos\left(\frac{\pi}{3}\text{ rad}\right)}$

Default angle unit: Radians

SHIFT **SETUP** **▼** **▼** **F2** (Rad) **QUIT**

1 **÷** **cos** **(** **SHIFT** **π** **÷** **3** **)** **EXE**

Result: 2

Example 3 $\tan(-35\text{grad})$

Default angle unit: Grads

SHIFT **SETUP** **▼** **▼** **F3** (Gra) **QUIT**

tan **(-)** **3** **5** **EXE**

Result: -0.6128007881

(2) Logarithmic and Exponential Function Calculations

- A base 10 logarithm (common logarithm) is normally written as \log_{10} or \log .
- A base e ($\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = 2.71828\dots$) logarithm (natural logarithm) is normally written as \log_e or \ln .

Note that certain publications use “log” to refer to base e logarithms, so you must take care to watch for what type of notation is being used in the publications you are working with. This calculator and manual use “log” to mean base 10 and “ln” for base e .

●To perform logarithmic/exponential function calculations

Example 1 $\log 1.23$

\log $\boxed{1}$ $\boxed{\cdot}$ $\boxed{2}$ $\boxed{3}$ $\boxed{\text{EXE}}$

Result: 0.0899051114

Example 2 $\ln 90$

\ln $\boxed{9}$ $\boxed{0}$ $\boxed{\text{EXE}}$

Result: 4.49980967

Example 3 To calculate the anti-logarithm of common logarithm 1.23 ($10^{1.23}$)

SHIFT $\boxed{10^x}$ $\boxed{1}$ $\boxed{\cdot}$ $\boxed{2}$ $\boxed{3}$ $\boxed{\text{EXE}}$

Result: 16.98243652

Example 4 To calculate the anti-logarithm of natural logarithm 4.5 ($e^{4.5}$)

SHIFT $\boxed{e^x}$ $\boxed{4}$ $\boxed{\cdot}$ $\boxed{5}$ $\boxed{\text{EXE}}$

Result: 90.0171313

Example 5 $(-3)^4 = (-3) \times (-3) \times (-3) \times (-3)$

$\boxed{(-)}$ $\boxed{3}$ $\boxed{\text{)}} \wedge \boxed{4}$ $\boxed{\text{EXE}}$

Result: 81

Example 6 ${}^7\sqrt{123}$

$\boxed{7}$ SHIFT $\boxed{\sqrt[x]}$ $\boxed{1}$ $\boxed{2}$ $\boxed{3}$ $\boxed{\text{EXE}}$

Result: 1.988647795

(3) Other Functions

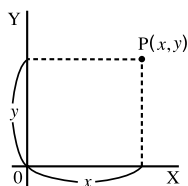
Example	Operation	Display
$\sqrt{2} + \sqrt{5} = 3.65028154$	SHIFT $\boxed{\sqrt{}}$ $\boxed{2}$ $\boxed{+}$ SHIFT $\boxed{\sqrt{}}$ $\boxed{5}$ $\boxed{\text{EXE}}$	3.65028154
$(-3)^2 = (-3) \times (-3) = 9$	$\boxed{(-)}$ $\boxed{3}$ $\boxed{\text{)}} \boxed{x^2}$ $\boxed{\text{EXE}}$	9
$-3^2 = -(3 \times 3) = -9$	$\boxed{(-)}$ $\boxed{3}$ $\boxed{x^2}$ $\boxed{\text{EXE}}$	- 9
$\frac{1}{\frac{1}{3} - \frac{1}{4}} = 12$	$\boxed{1}$ SHIFT $\boxed{x^{-1}}$ $\boxed{-}$ $\boxed{4}$ SHIFT $\boxed{x^{-1}}$ $\boxed{\text{EXE}}$ SHIFT $\boxed{x^{-1}}$ $\boxed{\text{EXE}}$	12
$8! (= 1 \times 2 \times 3 \times \dots \times 8)$ $= 40320$	$\boxed{8}$ OPTN $\boxed{\text{F4}}$ (PROB) $\boxed{\text{F1}}$ ($x!$) $\boxed{\text{EXE}}$	40320
${}^3\sqrt{36 \times 42 \times 49} = 42$	SHIFT $\boxed{\sqrt[x]}$ $\boxed{3}$ $\boxed{6}$ $\boxed{\times}$ $\boxed{42}$ $\boxed{\times}$ $\boxed{49}$ $\boxed{\text{EXE}}$	42
Random number generation (pseudo random number between 0 and 1.)	OPTN $\boxed{\text{F4}}$ (PROB) $\boxed{\text{F4}}$ (Ran#) $\boxed{\text{EXE}}$	(Ex.) 0.4810497011

Example	Operation	Display
What is the absolute value of the common logarithm of $\frac{3}{4}$?	$\boxed{\text{OPTN}} \boxed{\text{F1}} (\text{NUM})$ $\boxed{\text{F1}} (\text{Abs}) \boxed{\log} \boxed{\frac{3}{4}} \boxed{\text{EXE}}$	0.1249387366
What is the integer part of $\frac{7800}{96}$?	$\boxed{\text{OPTN}} \boxed{\text{F1}} (\text{NUM})$ $\boxed{\text{F2}} (\text{Int}) \boxed{\frac{7800}{96}} \boxed{\text{EXE}}$	81
What is the decimal part of $\frac{7800}{96}$?	$\boxed{\text{OPTN}} \boxed{\text{F1}} (\text{NUM})$ $\boxed{\text{F3}} (\text{Frac}) \boxed{\frac{7800}{96}} \boxed{\text{EXE}}$	0.25
$200 \div 6 =$	$\boxed{200} \boxed{\div} \boxed{6} \boxed{\text{EXE}}$	33.33333333
$\times 3 =$	$\boxed{\times} \boxed{3} \boxed{\text{EXE}}$	100
Round the value used for internal calculations to 11 digits*	$\boxed{200} \boxed{\div} \boxed{6} \boxed{\text{EXE}}$ $\boxed{\text{OPTN}} \boxed{\text{F1}} (\text{NUM}) \boxed{\text{F4}} (\text{Rnd}) \boxed{\text{EXE}}$ $\boxed{\times} \boxed{3} \boxed{\text{EXE}}$	33.33333333 33.33333333 99.99999999
What is the nearest integer not exceeding -3.5 ?	$\boxed{\text{OPTN}} \boxed{\text{F1}} (\text{NUM}) \boxed{\text{F1}} (\text{Intg})$ $\boxed{(-)} \boxed{3.5} \boxed{\text{EXE}}$	-4

* When a Fix (number of decimal places) or Sci (number of significant digits) is in effect, Rnd rounds the value used for internal calculations in accordance with the current Fix or Sci specification. In effect, this makes the internal value match the displayed value.

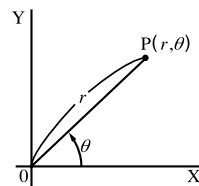
(4) Coordinate Conversion

• Rectangular Coordinates



Pol
→
←
Rec

• Polar Coordinates



- With polar coordinates, θ can be calculated and displayed within a range of $-180^\circ < \theta \leq 180^\circ$ (radians and grads have same range).

Example To calculate r and θ° when $x = 14$ and $y = 20.7$

Operation	Display
$\boxed{\text{SHIFT}} \boxed{\text{SETUP}} \boxed{\text{F1}} (\text{Deg}) \boxed{\text{QUIT}}$	
$\boxed{\text{OPTN}} \boxed{\text{F2}} (\text{ANGL}) \boxed{\text{F1}} (\text{Pol}) \boxed{14} \boxed{\text{F2}} (\text{ANG}) \boxed{20.7} \boxed{\text{EXE}}$	
	Ans
	1 $\boxed{24.989} \rightarrow 24.98979792 (r)$
	2 $\boxed{55.928} \rightarrow 55.92839019 (\theta)$

Example To calculate x and y when $r = 25$ and $\theta = 56^\circ$

Operation	Display
$\boxed{\text{SHIFT}} \boxed{\text{SETUP}} \boxed{\blacktriangledown} \boxed{\blacktriangledown} \boxed{\text{F1}} (\text{Deg}) \boxed{\text{QUIT}}$ $\boxed{\text{OPTN}} \boxed{\triangleright} \boxed{\text{F2}} (\text{ANGL}) \boxed{\triangleright} \boxed{\triangleright}$ $\boxed{\text{F2}} (\text{Rec}) \boxed{25} \boxed{\rightarrow} \boxed{56} \boxed{\text{EXE}}$	Ans 1 $\boxed{13.979} \rightarrow 13.97982259 (x)$ 2 $\boxed{20.725} \rightarrow 20.72593931 (y)$

(5) Permutation and Combination

• Permutation

$${}_nP_r = \frac{n!}{(n-r)!}$$

• Combination

$${}_nC_r = \frac{n!}{r! (n-r)!}$$

Example To calculate the possible number of different arrangements using 4 items selected from among 10 items

Formula	Operation	Display
${}_{10}P_4 = 5040$	$10 \boxed{\text{OPTN}} \boxed{\text{F4}} (\text{PROB})$ $\boxed{\text{F2}} ({}_nP_r) \boxed{4} \boxed{\text{EXE}}$	5040

Example To calculate the possible number of different combinations of 4 items that can be selected from among 10 items

Formula	Operation	Display
${}_{10}C_4 = 210$	$10 \boxed{\text{OPTN}} \boxed{\text{F4}} (\text{PROB})$ $\boxed{\text{F3}} ({}_nC_r) \boxed{4} \boxed{\text{EXE}}$	210

(6) Other Things to Remember

■ Multiplication Sign

You can leave out the multiplication sign in any of the following cases.

- In front of the following scientific functions:

$\sin, \cos, \tan, \sin^{-1}, \cos^{-1}, \tan^{-1}, \log, \ln, 10^x, e^x, \sqrt{}, \sqrt[3]{}, \text{Pol}(x, y), \text{Rec}(r, \theta), d/dx,$
 $\text{Seq}, \text{Min}, \text{Max}, \text{Mean}, \text{Median}, \text{List}, \text{Dim}, \text{Sum}$

Examples: $2 \sin 30, 10 \log 1.2, 2 \sqrt{3}$, etc.

- In front of constants, variable names, Ans memory contents.

Examples: $2\pi, 2AB, 3\text{Ans}, 6X$, etc.

- In front of an open parenthesis.

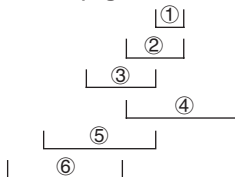
Examples: $3(5 + 6), (A + 1)(B - 1)$

■ Calculation Priority Sequence

The calculation priority sequence is the order that the calculator performs operations. Note the following rules about calculation priority sequence.

- Expressions contained in parentheses are performed first.
- When two or more expressions have the same priority, they are executed from right to left.

Example $2 + 3 \times (\log \sin 2\pi^2 + 6.8) = 22.07101691$ (angle unit = Rad)



The following is a complete list of operations in the sequence they are performed.

1. Coordinate transformation: (Pol (x, y) , Rec (r, θ) ; differential calculations: d/dx ;
List: Fill, Seq, Min, Max, Mean, Median, SortA, SortD
2. Type A functions (value input followed by function): $x^2, x^{-1}, x!$
sexagesimal input: $^\circ ' ''$
3. Powers: $^{\wedge} (x^y)$; roots: $^x\sqrt{\quad}$
4. Fraction input: $a^{b/c}$
5. Multiplication operations where the multiplication sign before π or a variable is omitted: 2π ; $5A$; $3\sin x$; etc.
6. Type B functions (function followed by value input):
 $\sqrt{\quad}, ^3\sqrt{\quad}, \log, \ln, e^x, 10^x, \sin, \cos, \tan, \sin^{-1}, \cos^{-1}, \tan^{-1}, (-), \text{Dim}, \text{Sum}$
7. Multiplication operations where the multiplication sign before a scientific function is omitted: $2\sqrt{3}$; $A\log 2$; etc.
8. Permutation: nPr ; combination: nCr
9. Multiplication; division; integer division; remainder division
10. Addition; subtraction
11. Relational operators: $=, \neq, >, <, \geq, \leq$

■ Using Multistatements

Multistatements are formed by connecting a number of individual statements for sequential execution. You can use multistatements in manual calculations and in programmed calculations. There are two different ways that you can use to connect statements to form multistatements.

• Colon (:)

Statements that are connected with colons are executed from left to right, without stopping.

• Display Result Command (▲)

When execution reaches the end of a statement followed by a display result command, execution stops and the result up to that point appears on the display. You can resume execution by pressing the **EXE** key.

•To use multistatements

Example $6.9 \times 123 = 848.7$

$123 \div 3.2 = 38.4375$

AC 1 2 3 → ALPHA A
 SHIFT PRGM > > F2 (:)
 6 . 9 X ALPHA A SHIFT PRGM > F2 (▲)
 ALPHA A ÷ 3 . 2 . 2 EXE

EXE

123+A:6.9XA,
 A÷3.2
 848.7
 - DISP -

Intermediate result at point
 where "▲" is used.

123+A:6.9XA,
 A÷3.2
 848.7
 38.4375

- Note that the final result of a multistatement is always displayed, regardless of whether it ends with a display result command.
- You cannot construct a multistatement in which one statement directly uses the result of the previous statement.

Example $123 \times 456 : \times 5$

Invalid

■ Stacks

When the calculator performs a calculation, it temporarily stores certain information in memory areas called a "stacks" where it can later recall the information when it is necessary.

There are actually two stacks: a 10-level numeric stack and a 26-level command stack. The following example shows how data is stored in the stacks.

$2 \times ((3 + 4 \times (5 + 4) \div 3) \div 5) + 8 =$

↑ ↑ ↑ ↑ ↑ ↑
 ① ② ③ ④ ⑤ ⑥ ——— Numeric stack
 ① ② ③ ④ ——— Command stack

A calculation can become so complex that it requires too much stack memory and cause a stack error (Stk ERROR) when you try to execute it. If this happens, try simplifying your calculation or breaking it down into separate parts. See "How to Calculate Memory Usage" for details on how much memory is taken up by various commands.

■ Errors

An error message appears on the display and calculation stops whenever the calculator detects some problem. Press **AC** to clear the error message.

The following is a list of all the error messages and what they mean.

Ma ERROR - (Mathematical Error)

- A value outside the range of $\pm 9.99999999 \times 10^{99}$ was generated during a calculation, or an attempt was made to store such a value in memory.
- An attempt was made to input a value that exceeds the range of the scientific function being used.
- An attempt was made to perform an illegal statistical operation.

Stk ERROR - (Stack Error)

- The calculation being performed caused the capacity of one of the stacks to be exceeded.

Syn ERROR - (Syntax Error)

- An attempt to use an illegal syntax.

Arg ERROR - (Argument Error)

- An attempt to use an illegal argument with a scientific function.

Dim ERROR - (Dimension Error)

- An attempt to perform an operation with two or more lists when the dimensions of the lists do not match.



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In addition to the above, there are also a Mem ERROR and Go ERROR. See "Error Message Table" for details.

■ How to Calculate Memory Usage

Some key operations take up one byte of memory each, while others take up two bytes.

1-byte operations: 1, 2, 3, ..., sin, cos, tan, log, ln, $\sqrt{\quad}$, π , etc.

2-byte operations: $d/dx($, Xmin, If, For, Return, DrawGraph, SortA(, Sum, etc.

For full details on the functions that require two bytes, see the "2-byte Command Table".



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■ Memory Status (MEM)

You can check how much memory is used for storage for each type of data. You can also see how many bytes of memory are still available for storage.

●To check the memory status

1. In the Main Menu, select the **MEM** icon and press **EXE**.

```
Memory
Memory Usage
Reset
Select:[↑][↓]
Set :[EXE]
```

2. Press **EXE** again to display the memory status screen.

Number of bytes still free —

```
Memory Usage
Program: 29
Stat : 0
List : 60
6821 Free
DEL
```

3. Use **▲** and **▼** to move the highlighting and view the amount of memory (in bytes) used for storage of each type of data.

The following table shows all of the data types that appear on the memory status screen.

Data type	Meaning
Program	Program data
Stat	Statistical calculations and graphs
List	List data
Y=	Graph functions
Draw	Graph drawing conditions (View Window, enlargement/reduction factor, graph screen)
V-Win	View Window memory data
Table	Table & Graph data
Alpha	Alpha memory data

■ Clearing Memory Contents

●To clear all data within a specific data type

1. In the memory status screen, use **▼** and **▲** to move the highlighting to the data type whose data you want to clear.

2. Press **F1** (DEL).

F1(DEL)



3. Press **F1** (YES) to clear the data or **F4** (NO) to abort the operation without clearing anything.

■ Variable Data (VARS) Menu

You can use the variable data menu to recall the data listed below.

- View Window values
- Enlargement/reduction factor
- Single-variable/paired-variable statistical data
- Graph functions
- Table & Graph table range and table contents

To recall variable data, press **VAR** to display the variable data menu.

VAR



F1 (V-WIN) View Window values

F2 (FACT) x and y -axis enlargement/reduction factor

▶



F1 (STAT) Single/paired-variable statistical data

F2 (GRPH) Graph functions stored in the GRAPH Mode

F3 (TABL) Table & Graph function table range and table contents

Press **▶** to return to the previous menu.

●To recall View Window values

Pressing **F1** (V-WIN) while the variable data menu is on the screen displays a View Window value menu.

F1 (V-WIN)



F1 (Xmin) *x*-axis minimum

F2 (Xmax) *x*-axis maximum

F3 (Xscl) *x*-axis scale



F1 (Ymin) *y*-axis minimum

F2 (Ymax) *y*-axis maximum

F3 (Yscl) *y*-axis scale



F1 (Tmin) Minimum of T

F2 (Tmax) Maximum of T

F3 (Tpth) Pitch of T

Press to return to the previous menu.

●To recall enlargement and reduction factors

Pressing **F2** (FACT) while the variable data menu is on the screen displays an enlargement/reduction factor menu.

F2 (FACT)



F1 (Xfct) *x*-axis enlargement/reduction factor

F2 (Yfct) *y*-axis enlargement/reduction factor

●To recall single/paired-variable statistical data

Pressing and then **F1** (STAT) while the variable data menu is on the screen displays a statistical data menu.

F1 (STAT)



F1 (X) Single/paired-variable
x-data menu

F2 (Y) Paired-variable *y*-data menu

F3 (GRPH) Statistical graph data menu

F4 (PTS) Summary point data menu

The following menu appears whenever you press **F1** (X), while the statistical data menu is on the display.

F1 (X)

- F1** (n) Number of data
- F2** (\bar{x}) Mean of x data
- F3** (Σx) Sum of x data
- F4** (Σx^2) x data sum of squares

▶



- F1** ($\chi\sigma_n$) x data population standard deviation
- F2** ($\chi\sigma_{n-1}$) x data sample standard deviation
- F3** (minX) x data minimum value
- F4** (maxX) x data maximum value

Press **▶** to return to the previous menu.

The following menu appears whenever you press **F2** (Y) while the statistical data menu is on the display.

F2 (Y)

- F1** (\bar{y}) Mean of y data
- F2** (Σy) Sum of y data
- F3** (Σy^2) y data sum of squares
- F4** (Σxy) x data and y data sum of products

▶



- F1** ($y\sigma_n$) y data population standard deviation
- F2** ($y\sigma_{n-1}$) y data sample standard deviation
- F3** (minY) y data minimum value
- F4** (maxY) y data maximum value

Press **▶** to return to the previous menu.

The following menu appears whenever you press **F3** (GRPH) while the statistical data menu is on the display.

F3 (GRPH)



F1 (a)-**F3** (c) .. Statistical graph regression coefficient and multinomial coefficients

F4 (r) Statistical graph correlation coefficient

▶



F1 (Q1) First quartile

F2 (Med) Median of input data

F3 (Q3) Third quartile

F4 (Mod) Mode of input data

Press **▶** to return to the previous menu.

The following menu appears whenever you press **F4** (PTS) while the statistical data menu is on the display.

F4 (PTS)



F1 (x1)-**F4** (y2) Coordinates of summary points

▶



F1 (x3)-**F2** (y3) Coordinates of summary points

Press **▶** to return to the previous menu.

●To recall graph functions

Pressing **▶** and then **F2** (GRPH) while the variable data menu is on the screen displays a graph function menu.

▶ F2 (GRPH)



Input a storage area number and then press one of the following function keys to recall the corresponding graph function stored in that storage area.

F1 (Y) Rectangular coordinate or inequality function

F2 (Xt) Parametric graph function Xt

F3 (Yt) Parametric graph function Yt

●To recall Table & Graph table range and table content data

Pressing **F1** and then **F3** (TABL) while the variable data menu is on the screen displays a Table & Graph data menu.

F1 **F3** (TABL)

Strt	End	Pitch
F1	F2	F3

F1 (Strt) Table range start value (**F Start** command)

F2 (End) Table range end value (**F End** command)

F3 (Pitch) Table value increment (**F Pitch** command)